Name:

## at1124exam: Radicals and Squares (v817)

### Question 1

Simplify the radical expressions.

| $\sqrt{45}$ | $\sqrt{20}$ | $\sqrt{18}$ |
|---|---|---|
| $\sqrt{3 \cdot 3 \cdot 5}$ | $\sqrt{2 \cdot 2 \cdot 5}$ | $\sqrt{3 \cdot 3 \cdot 2}$ |
| $3\sqrt{5}$ | $2\sqrt{5}$ | $3\sqrt{2}$ |

### Question 2

Find all solutions to the equation below:

$$4(x-9)^2 - 5 \;=\; 95$$

First, add 5 to both sides.

$$4(x-9)^2 = 100$$

Then, divide both sides by 4.

$$(x-9)^2 = 25$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 9 = \pm 5$$

Add 9 to both sides.

$$x = 9 \pm 5$$

So the two solutions are $x = 14$ and $x = 4$.

**Question 3**

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 18x = -45$$

$$x^2 - 18x + 81 = -45 + 81$$
$$x^2 - 18x + 81 = 36$$
$$(x - 9)^2 = 36$$
$$x - 9 = \pm 6$$
$$x = 9 \pm 6$$
$$x = 15 \quad \text{or} \quad x = 3$$

**Question 4**

A quadratic polynomial function is shown below in standard form.

$$y = 2x^2 - 24x + 68$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 - 12x) + 68$$

We want a perfect square. Halve -12 and square the result to get 36 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 - 12x + 36 - 36) + 68$$

Factor the perfect-square trinomial.

$$y = 2((x - 6)^2 - 36) + 68$$

Distribute the 2.

$$y = 2(x - 6)^2 - 72 + 68$$

Combine the constants to get **vertex form**:

$$y = 2(x - 6)^2 - 4$$

The vertex is at point $(6, -4)$.